

WHAT IS CLAIMED IS:

1. A method for examination of a subject comprising the steps of:

5 - administering a contrast-enhancing agent into a subject to be examined, said contrast-enhancing agent introducing density variations in said subject;

- directing ionizing radiation towards said subject; and

10 - detecting ionizing radiation spatially resolved as transmitted through said subject, while Compton scattered radiation in said subject is essentially prevented from being detected, wherein

15 - said ionizing radiation directed towards said subject is provided within a spectral range so that more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said subject to thereby detect the density variations introduced by the contrast-enhancing agent in said subject spatially resolved.

2. The method of claim 1 wherein said contrast-enhancing agent is a contrast agent for ultrasound examination.

20 3. The method of claim 2 wherein said contrast-enhancing agent comprises, or is capable of generating, dispersions of gas microbubbles.

25 4. The method of claim 2 wherein said method is combined with a spatially resolved ultrasound examination method, said spatially resolved ultrasound examination method being performed using said contrast-enhancing agent to thereby detect the density variations introduced by said contrast-

enhancing agent in said subject spatially resolved also by said ultrasound examination method.

5. The method of claim 1 wherein said subject is human tissue, preferably a breast.

6. The method of claim 5 wherein said ionizing radiation is provided as broadband X-ray radiation between 10 and 300 keV.

7. The method of claim 5 wherein said ionizing radiation is provided as broadband X-ray radiation between 20 and 100 keV.

8. The method of claim 5 wherein said ionizing radiation is 10 provided as broadband X-ray radiation above 30 keV.

9. The method of claim 1 wherein said ionizing radiation is provided as radiation above 30 keV.

10. The method of claim 1 wherein said ionizing radiation is provided within a spectral range, at which photoelectric 15 absorption does not essentially occur in said subject.

11. The method of claim 1 wherein said ionizing radiation is provided within a spectral range such that at least 2 times more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said 20 subject.

12. The method of claim 1 wherein said ionizing radiation is provided within a spectral range such that at least 5 times more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said 25 subject.

13. The method of claim 1 wherein said ionizing radiation is provided within a spectral range such that at least 10 times

more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said subject.

14. The method of claim 1 wherein the step of detecting ionizing radiation spatially resolved as transmitted through said subject is performed by means of a gaseous-based parallel plate detector comprising an ionizable gas.

15. The method of claim 14 wherein electrons released as a result of ionization of said ionizable gas by said ionizing radiation are avalanche amplified before being detected.

16. An apparatus for radiographic examination of a subject comprising:

- an X-ray source emitting broadband ionizing radiation;
- a filter arrangement arranged in front of said X-ray source for filtering said emitted broadband ionizing radiation;
- a subject region provided for housing said subject during said radiographic examination and arranged so that said filtered broadband ionizing radiation can be transmitted through said subject;
- a device provided for administering a contrast-enhancement agent into said subject; and
- a detector device arranged to record an image of said filtered broadband ionizing radiation as being transmitted through said subject, wherein
- said filter arrangement has a filter function depending on the subject to be measured so that said ionizing radiation as filtered is within a spectral range so that more X-ray photons

of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said subject;

- said device provided for administering a contrast-enhancement agent into said subject, is provided for administering a contrast-enhancement agent into said subject, which introduces density variations in said subject; and

- said detector device is arranged to essentially prevent Compton scattered radiation in said subject from being detected.

17. The apparatus of claim 16 wherein said contrast-enhancing agent is a contrast agent for ultrasound examination.

18. The apparatus of claim 17 wherein said contrast-enhancing agent comprises, or is capable of generating, dispersions of gas microbubbles.

19. The apparatus of claim 17 further comprising a spatially resolved ultrasound examination apparatus, said spatially resolved ultrasound examination apparatus being provided to use said contrast-enhancing agent to thereby detect said density variations introduced by said contrast-enhancing agent in said subject spatially resolved.

20. The apparatus of claim 16 wherein said subject is human tissue.

21. The apparatus of claim 20 wherein said human tissue is a breast.

22. The apparatus of claim 16 wherein said filter arrangement has a filter function so that said ionizing radiation as filtered is provided within a spectral range such that at least 2 times more photons of said ionizing radiation are

Compton scattered than absorbed through the photoelectric effect in said subject.

23. The apparatus of claim 16 wherein said filter arrangement has a filter function so that said ionizing radiation as
5 filtered is provided within a spectral range such that at least 5 times more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said subject.

24. The apparatus of claim 16 wherein said filter arrangement
10 has a filter function so that said ionizing radiation as filtered is provided within a spectral range such that at least 10 times more photons of said ionizing radiation are Compton scattered than absorbed through the photoelectric effect in said subject.

25. The apparatus of claim 16 wherein said detector device is
15 a gaseous-based parallel plate detector comprising an ionizable gas.

26. The apparatus of claim 25 wherein said detector device is
20 an electron avalanche detector, in which electrons released as a result of ionization of said ionizable gas by said ionizing radiation are avalanche amplified before being detected.

27. A method for examination of a subject comprising the steps of:

- administering a contrast-enhancing agent into a subject to
25 be examined, said contrast-enhancing agent introducing density variations in said subject;

- directing ionizing radiation towards said subject; and

- detecting ionizing radiation spatially resolved as transmitted through said subject, while Compton scattered radiation in said subject is essentially prevented from being detected, wherein

- 5 - said ionizing radiation directed towards said subject is provided within a spectral range so that Compton scattering dominates over photoelectric effect in said subject to thereby detect the density variations introduced by the contrast-enhancing agent in said subject spatially resolved.

10 28. A method for examination of a subject comprising the steps of:

- administering a contrast-enhancing agent into a subject to be examined, said contrast-enhancing agent introducing density variations in said subject;

- 15 - directing ionizing radiation towards said subject; and

- detecting ionizing radiation spatially resolved as transmitted through said subject, while a majority of the Compton scattered radiation in said subject is essentially prevented from being detected, wherein

- 20 - said ionizing radiation directed towards said subject is provided within a spectral range depending on said subject to obtain Compton scattering as a dominating interaction mechanism between said ionizing radiation and said subject to thereby detect the density variations introduced by the contrast-enhancing agent in said subject spatially resolved.

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29. An apparatus for radiographic examination of a subject comprising:

- an X-ray source emitting broadband ionizing radiation;

- a filter arrangement arranged in front of said X-ray source for filtering said emitted broadband ionizing radiation;

- a subject region provided for housing said subject during said radiographic examination and arranged so that said filtered broadband ionizing radiation can be transmitted through said subject;

- a device provided for administering a contrast-enhancement agent into said subject; and

- a detector device arranged to record an image of said filtered broadband ionizing radiation as being transmitted through said subject, wherein

- said filter arrangement has a filter function depending on the subject to be measured so that said ionizing radiation as filtered is within a spectral range so that Compton scattering dominates over photoelectric effect in said subject;

- said device provided for administering a contrast-enhancement agent into said subject, is provided for administering a contrast-enhancement agent into said subject, which introduces density variations in said subject; and

- said detector device is arranged to prevent the majority of Compton scattered radiation in said subject from being detected.

30. An apparatus for radiographic examination of a subject comprising:

- an X-ray source emitting broadband ionizing radiation;

- a filter arrangement arranged in front of said X-ray source for filtering said emitted broadband ionizing radiation;

- a subject region provided for housing said subject during said radiographic examination and arranged so that said filtered broadband ionizing radiation can be transmitted through said subject;

5 - a device provided for administering a contrast-enhancement agent into said subject; and

- a detector device arranged to record an image of said filtered broadband ionizing radiation as being transmitted through said subject, wherein

10 - said filter arrangement has a filter function depending on the subject to be measured so that said ionizing radiation as filtered is within a spectral range to obtain Compton scattering as a dominating interaction mechanism between said ionizing radiation and said subject;

15 - said device provided for administering a contrast-enhancement agent into said subject, is provided for administering a contrast-enhancement agent into said subject, which introduces density variations in said subject; and

20 - said detector device is arranged to essentially prevent the Compton scattered radiation in said subject from being detected.